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(54) Rotor for mineral breaker.

(57) A rotor (1) for a mineral breaker in which has a removable top plate (4) providing in situ access to the interiors of the rotor (1) and wear parts (4), (8) which can be revolved by sector to maximise the use of same.

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ROTOR FOR MINERAL BREAKER

This invention relates to rotary mineral breakers.

An example of an earlier form of rotary mineral breaker is described by United States Patent No. 3970257. This specification describes a mineral breaker provided with a rotor positioned within a housing. Material is fed into the rotor and flung at high speed at the housing walls (which themselves become lined with material) and material to material contact is largely responsible for the crushing action of the apparatus.

The nature of this apparatus is such that there are severe mechanical stresses and wear problems which must to be accommodated by adequate design. Vertical and horizontal surfaces are subject to wear and these surfaces must be protected.

US Patent No. 4586663 addresses the problem of wear on vertical tip surfaces. The same if not a more severe wear problem applies to horizontal surfaces. There are a number of problems with the aforementioned constructions with respecto which solutions are not readily apparent. The rotors are subject to extreme conditions of wear and mechanical stress as would be appreciated from an understanding of the functions of same. Because of the extreme mechanical forces which the rotors must withstand, it was previously assumed that strong tension resistant materials must be used for the top, bottom and sides of the rotors. Subsequently rotors built to date have been constructed as a one piece cage with the only access to wear parts being via an upper inlet port or outlet ports at the sides of the rotor. Because of poor access protective linings for the upper and lower internal surfaces of the rotor have been provided in pieces and removed and fixed via the very limited access provided by the inlet and outlet ports.

The sides of the rotors are subject to constant frictional contact with the material to be crushed and seams on the side walls of the rotor should be avoided if possible as such tend to become a focus for wear. It is also desirable that the rotor outer surfaces be as smooth as possible with minimal protrustion.

It is an object of the present invention to provide improvement to rotor construction for rotary mineral breakers of the kind described.

Further objects and advantages of the present invention will become apparent from the ensuing description which is given by way of example.

According to one aspect of the present invention there is provided a rotor for a mineral breaker said rotor being of a generally drum-shaped configuration having a substantially centrally positioned entry port in the upper surface thereof and at least one outlet port in the wall thereof so that material fed into the entry part is able to escape from the moving rotor via the said at least one outlet port, said rotor further comprising a detachable top plate which covers substantially all of the exposed upper internal surfaces of the rotor, said top plate being supported by side walls of the rotor.

The sides and base of the rotor can be fabricated from a material having a comparatively superior resistance to tensile forces relative to the qualities of the material from which the top plate is formed.

The uppermost regions of the side walls of the rotor can be provided with a rim providing an internal ledge to which outer peripheral edges of the top plate can be removably fixed.

The rim can be defined by an inwardly directed ring which extends from the sides of the rotor and which provides means by which outer peripheral edges of the top plate can be fixed and in addition enhances the strength of the rotor adjacent the top plate providing resistance to forces acting at a tangent or radially to the sides thereof.

The said at least one outlet port is flanked by inwardly directed deflector plates and wear tips.

The top plate can have a number of apertures therein to accommodate fixture members and is fixed to the ledge by said fixture members in at least three positions and is rotatable from one fixed position to another.

The rotor may include a base member protected by a lower wear plate which covers substantially the whole of the base member.

The lower wear plate can be fixed to the base of the rotor by a centrally positioned plug.

According to a further aspect of the present invention there is provided a top plate for a rotor for a mineral breaker as aforesaid, said top plate having a lower surface lined or comprising of a wear resistant material.

According to yet a further aspect of the present invention there is provided a lower wear plate for a rotor, said lower wear plate having an upper surface lined or comprising of a wear resistant material.

Aspects of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1: is a plan view of a typical rotor assembly with the top plate removed in accordance with one aspect of the present invention, and

Figure 2A: shows how the top plate of the rotor of Figure 1 is fixed to the side walls, and

Figures 3 & 4: respectively are part plan and sectional views of a bottom wear plate for the rotor of Figure 1, and

Figures 5 & 6: respectively are plan and sectional views of a rotor plug for the rotor of Figure 1 which fixes the bottom wear plate.

Firstly, with respect to Figures 1 and 2 of the drawings a rotor generally indicated by arrow 1 comprises a circulat base 2, side walls 3 extending from the base and a top plate generally indicated by arrow 4 which is removably fixed to the sides 3. The base 2 is mounted on a substantial sleeve 5 which includes an inner bearing 6 and a plate 7. The plate 7 is fixed to the baring 6 by bolts The base 2 mounts a lower wear plate generally indicated by arrow 8 which is secured in position by a central plug generally indicated by arrow 9. Securement of the lower wear plate 8 is reinforced by the positioning of rotor tips 10 and trail plates 11, the functions of which are described in the aforementioned prior art references.

The rotor illustrated is provided with a strengthening or hoop ring 12.

The top plate 4 (hereinafter referred to as the upper wear plate) is an annular member having a central aperture 13, and a stepped outer flange 14. The upper surface 16 of the wear plate is somewhat scolloped whilst the lower surface is provided with a horizontal portion 17 leading to a diverging portion 18 adjacent the aperture 13. Material entering the rotor via aperture 13 is dispatched via outlets 3A flanked by the rotor tips 10 and trail plates 11.

The sides 3 of the rotor 1 are provided with a plurality of countersunk bolt holes 15 so that bolts 12A can be used to secure the upper wear plate 4 can be revolved by sector to maximise life of the wear plate.

Figures 3 and 4 of the drawing illustrate one possible form of lower wear plate 8. The wear plate is a simple annular ring having a stepped internal bore 19 and an outer peripheral edge 20 with a number of notches 21 which accommodate arcuate extending portions of vertical tips 10 and trail plates 11. The lower wear plate 8 is provided with nine notches 21, three more than the total number of tips and trail plates and can be revolved by sector to maximise the life of the wear plate. Access to the bottom wear plate is provided by removing of the top wear plate 4 and rotor plug member 9.

Figures 5 and 6 of the drawings illustrate one possible form of plug member 9. The plug member 9 is generally frusto-conical in shape giving a dome-like upper surface 22, a stepped edge 23, a illustrates the inter-relationship between the member 9, the bottom wear plate and parts beneath it. A bolt single 26 secures the member in position.

By preference the base 2, walls 3 and ring 12 are fabricated from a tensile material such as mild steel, and the top and bottom wear plates and distributor plates and manufactured from a wear resistant material such as cast-iron. Other materials may be used to form the wear plates. The welding symbols indicate the appropriate metal to metal seams.

Modifications to the construction described may include using planar top surfaces of the rotor side walls as a support for the peripheral edges of the top plate and making the side walls sufficiently sturdy to cope with anticipated stresses during use. Such an arrangement would create a side seam but may be a practical possibility if the seam was protected by a sealant, such as a silicone sealant.

Whilst the top plate and lower wear plate are likely to be case in ferrous materials it is anticipated that synthetic materials such as nylon, plastics or ceramics may provide an option for either, particularly the lower wear plate which is non-structural.

It will be apparent that the present design, providng as it does access to the interiors of the rotor from above, has many advantages over existing side access rotors, including:

- increased ease of entry for maintenance purposes,
- increased design flexibility
- the provision of one-piece wear plates for areas within the rotor previously protected by wear a number of individual wear plates.

Aspects of the present invention have been described by way of example only and it will be appreciated that modifications and additions thereto may be made without departing from the spirit or scope thereof.

Claims

1. A rotor (1) for a mineral breaker said roto (1) being of a generally drum-shaped configuration and arranged to be rotated about a substantially vertical axis said rotor (1) having a substantially centrally positioned entry port (13) in the upper surface thereof and at least one outlet port (3A) in the wall (3) thereof so that material fed into the entry port (13) is able to escape from the moving rotor via the said at least one outlet port (3A), said rotor further comprising a detachable top plate (4) which covers substantially all of the exposed upper internal surfaces of the rotor, said top plate (4) being supported by side walls (3) of the rotor.

claim 1 wherein the sides (3) and base (2) of the rotor are fabricated from a material having a comparatively superior resistance to tensile forces relative to the qualities of the material from which the top plate (4) is formed.

3. A rotor (1) for a mineral breaker as claimed in claim 1 or claim 2 wherein the material from which at least lower surfaces of the top plate (4) are formed is selected to provide wear resistance.

4. A rotor (1) for a centrifugal mineral breaker as claimed in any one of claims 1 to 3 wherein the uppermost regions of the side walls (3) of the rotor are provided with a rim providing an internal ledge to which outer peripheral edges of the top plate (4) can re removably fixed.

5. A rotor (1) for a mineral breaker as claimed in claim 4 wherein the rim is defined by an inwardly directed ring (12) which extends from the sides of the rotor and which provides means by which outer peripheral edges of the top plate (4) can be fixed and in addition enhances the strength of the rotor adjacent the top plate (4) providing resistance to forces acting at a tangent or radially to the sides thereof.

6. A rotor (1) for a mineral breaker as claimed in any one of claims 1 to 5 wherein said at least one outlet port (3A) is flanked by inwardly directed deflector plates (11) and wear tips (10).

7. A rotor (1) for a mineral breaker as claimed in any one of claims 4 to 6 wherein the top plate (4) has a number of aperture (15) therein to accommodate fixture members and is fixed to the ledge (12) by said fixture members in at least three positions and is rotatable from one fixed position to another.

8. A rotor (1) for a mineral breaker as claimed in any one of claims 1 to 7 including a base member (2) protected by a lower wear plate (8) which covers substantially the whole of the base member (2).

9. A rotor (1) for a mineral breaker as claimed in any one of claims 1 to 8 wherein the lower wear plate (8) is fixed to the base (2) of the rotor by a centrally positioned plug (9).

10. A top plate for a rotor (1) for a mineral breaker as claimed in any one of claims 1 to 9 said top plate (4) having a lower surface lined or comprising of a wear resistant material.

11. A lower wear plate (8) for a rotor (1) as claimed in any one of claims 1 to 10, said lower wear plate (8) having an upper surface lined or comprising of a wear resistant material.

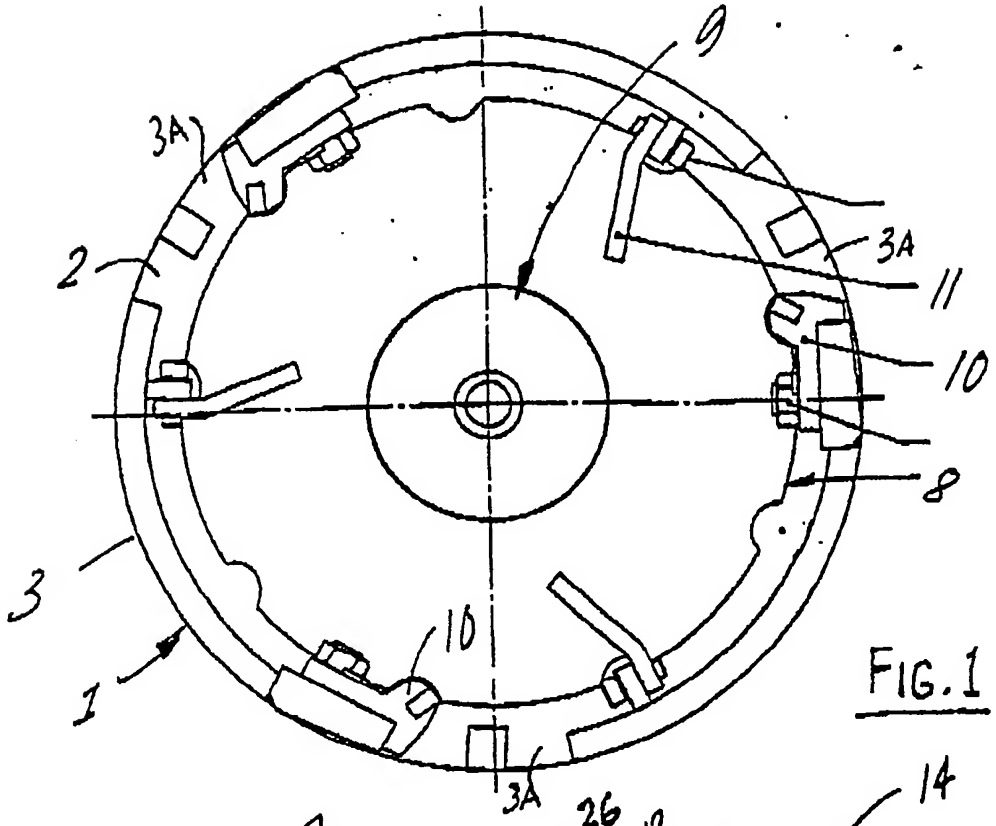

FIG. 1

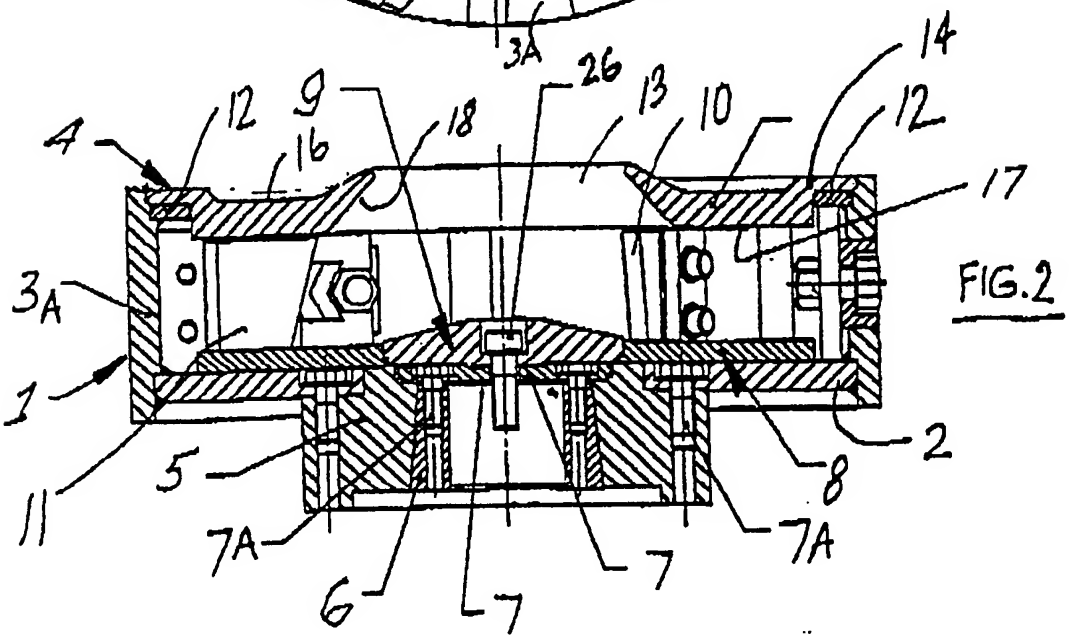

FIG. 2

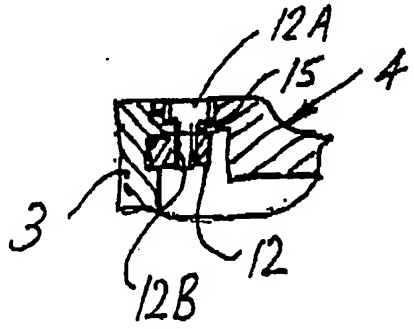

FIG. 2A.

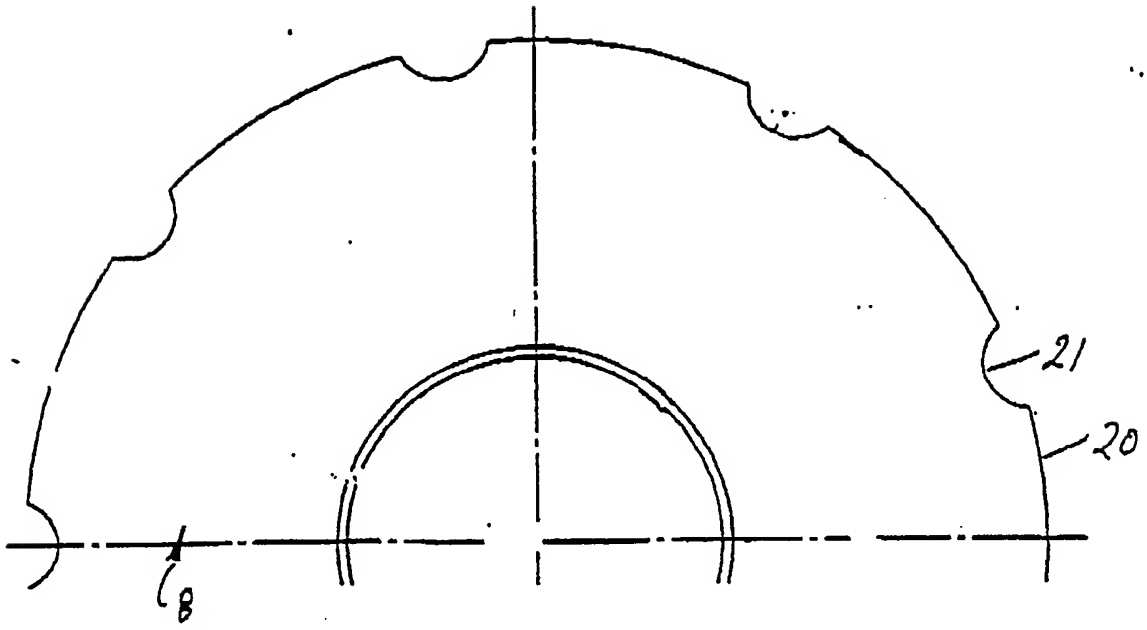

FIG 3

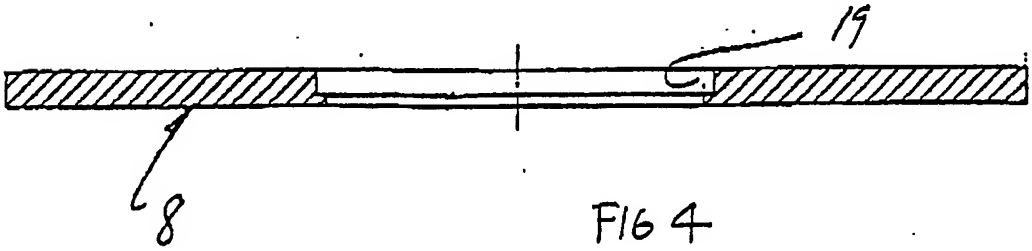

FIG 4

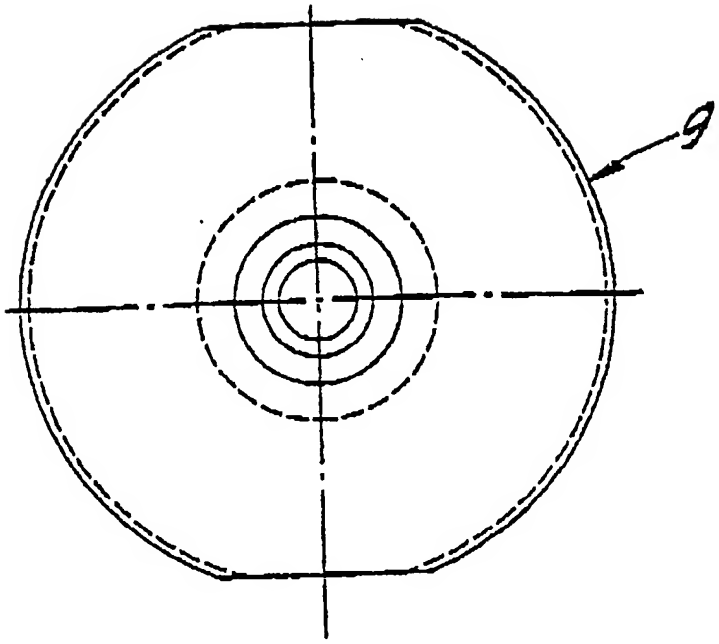

FIG 5

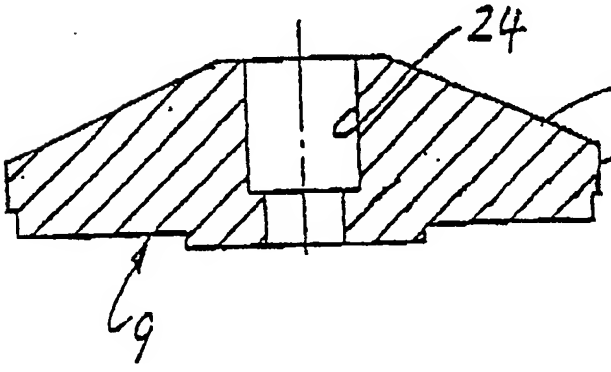

FIG 6